

REMARKS

Objection to claims 2 and 3 for informalities is noted. These claims have been amended in consideration of the Examiner's comments to correct the grammatical errors that were referenced. As amended, it is submitted these dependent claims now further define the invention with sufficient particularity to be patentable to Applicants.

Claims 1, 2, 4 and 6-8 have been rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. This rejection is respectfully traversed.

The claims, which have been amended merely to clarify the defined invention, specifically recite the method by which a biped walking system (as a physical structure) interacts with the supporting ground to apply torques to joints in the supporting legs. These aspects of the claimed invention relate to a real structure that has independent biped mobility under control of the calculated conditions, as claimed, for applying torques to joints in the supporting legs. Thus, contrary to the Examiner's contention, the claimed invention clearly satisfies statutory classification of patentable invention and involves transformative conversions of sensed conditions into requisite torques that are applied to joints of a physical structure in the manner as claimed for clearly useful, substantial, tangible results. It is therefore respectfully submitted that the claims 1, 2, 4 and 6-8 now define a statutory category of invention with sufficient particularity and distinctiveness to be patentable to Applicants.

Claims 1, 2, 4 and 6-8 have been rejected under 35 U.S.C. § 102(b) as being anticipated variously by J.H. Park et al (cited in IDS @ C41) or by Winters et al (cited in IDS @ C53) each considered on July 6, 2006, or by Kato et al (cited in IDS @ C1) considered on January 5, 2006. The rejections are respectfully traversed with respect to these claims as amended herein.

Specifically, these claims now variously recite “obtaining an actual point of application of the ground reaction force based on a position of the center of gravity of the whole body, positions of ankle joints and positions of joints at front ends of feet under normal condition and based on positions of the joints at front ends of feet when going up or down stairs or going uphill or downhill, wherein it is determined based on positions of the ankle joints while the both legs are in contact with the ground whether the system is under normal condition or going up or down stairs or going uphill or downhill,” and “obtaining moments acting around the joints of the leg, using the vertical component of the ground reaction force acting on the leg at the point of application of the ground reaction force, the vertical components of forces acting on the joints of the leg and a term of the acceleration of gravity and without using the horizontal components of the forces acting on the joints of the leg and a term of acceleration except the term of the acceleration of gravity; and applying torques to the joints of the leg, based on the moments acting around the joints of the leg.”

These aspects of the claimed invention, for example as described in the specification at pages 33 and 34, facilitate determining progress of the walking system uphill or downhill, or up or down stairs, or under normal conditions. In addition, the dependent claims are further limited to determining the actual point of application of ground reaction force, or to determining which leg(s) contact the ground based upon vertical acceleration measured on the body, and the like.

These aspects of the claimed inventions are not understood to be disclosed by J.H. Park et al or by Winder et al or by Kato et al in a manner as claimed by Applicants.

Specifically, I.H. Park et al discloses with respect to Figure 1 a 7-link biped robot and its coordinates. However, this reference fails to disclose how to obtain an actual point of application of ground reaction force to the walking system in any manner resembling Applicants' claimed invention.

Similarly, Winter et al discloses anthropometry in movement biomechanics, but fails to disclose how to obtain an actual point of application of the ground reaction force, in any manner resembling Applicant's claimed invention.

Regarding Kato et al, as this reference is currently understood at best appears to assume that the floor reaction ( $F_R$ ) and  $F_L$  are generated in the direction of the right ankle joint coordinates ( $X_R$ ) and the left ankle joint coordinates ( $X_L, Z_L$ ) toward the center of gravity coordinates ( $X_G, Z_G$ ) (e.g., page 10, line 26 to page 11, line 4).

Thus Kato et al assumes that points of application of the ground reaction force are at the right ankle joint coordinates ( $X_R, Z_R$ ) and at the left ankle joint coordinates ( $X_L, Z_L$ ) in contrast to the actual points of application of ground reaction force claimed by Applicants. This reference thus fails to disclose how to obtain actual points of application of ground reaction force in any manner resembling Applicants' claimed invention.

It is therefore respectfully submitted that claims 1, 2, 4 and 6-8 are not anticipated by, but instead are patentably distinguishable over the citations of J.H. Park et al and Winter et al and Kato et al.

Claims 3 and 5 have been variously rejected under 35 U.S.C. § 103(a) as being unpatentable over Park et al in view of Tagami et al '433, or over Winter et al in view of Tagami et al '433, or over Kato et al in view of Tagami et al '433. These rejections are respectfully traversed with respect to these claims as amended herein.

Specifically, these dependent claims are further limited over the distinguishing aspects of the claimed invention, as quoted in the above Remarks, and are distinguishable over the deficient disclosures of the cited references considered either alone or in the various combinations proposed by the Examiner.

Specifically, the deficient disclosures of J.H. Park et al. and Winter et al and Kato et al are discussed in the above Remarks. And, Tagami et al '433, for example with reference to Figure 2, discloses a six-dimensional force and torque sensor (44)

that detects a ground reaction force applied to the foot. In this reference, it is thus not necessary to calculate to obtain "an actual point of application of the ground reaction force based upon a position of the center of gravity of the whole body, positions of ankle joints and positions of joints at front ends of feet ..." in any manner resembling Applicants' claimed invention.

Thus, merely combining Tagami et al '433 with any of J.H. Pak et al, or Winter et al, or Kato et al fails to remedy the deficient disclosures of these latter references, as discussed in the above Remarks, and also fails to establish even a *prima facie* basis, including all recited steps of the method, from which a proper determination of obviousness can be formed. It is therefore respectfully submitted that dependent claims 3 and 5 are patentably distinguishable over the cited art.

Reconsideration and allowance of Claims 1-8 are solicited.

Respectfully submitted,  
Masakazu Kawai, et al.

Dated: 3/8/07

By: /Albert C. Smith/  
Albert C. Smith, Reg. No.: 20,355  
Fenwick & West LLP  
801 California Street  
Mountain View, CA 94041  
Tel.: (650) 335-7296  
Fax.: (650) 938-5200